Flood-Damaged Channels and Farmland Restored

Report on

Flood Rehabilitation Work by the Soil Conservation Service in the Great Plains

U. S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service
Region 5, Northern Great Plains
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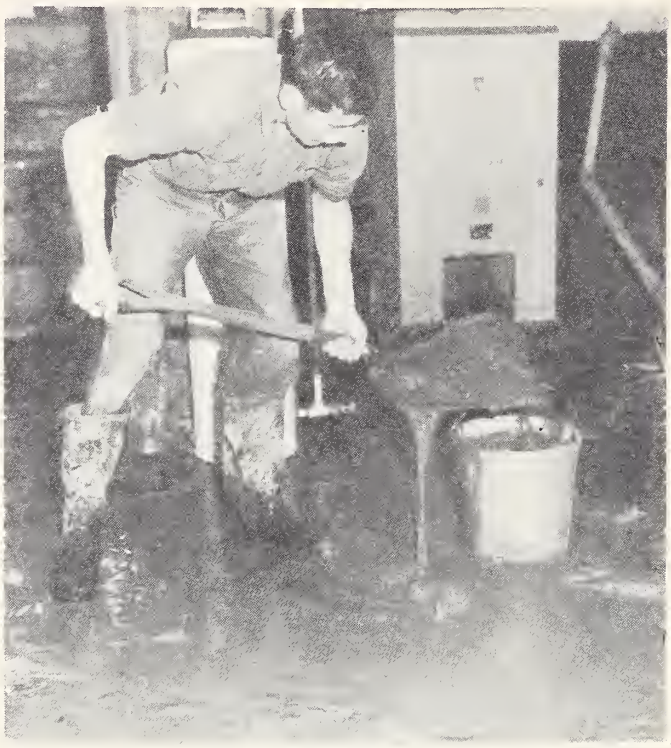
Two Huge Floods in Nation's Breadbasket



Two periods of extraordinarily severe flooding were responsible for the rehabilitation work done by the Soil Conservation Service in the Northern Great Plains from late 1951 to mid-1953.

Kansas bore the brunt of the first floods — in 1951 — which affected 82 of the state's 105 counties, but parts of Nebraska, Missouri and Oklahoma were hit hard also. These floods followed abnormally heavy rainfall during May, June and early July. Streams in eastern and southern Nebraska and northern and western Kansas had gone out of their banks before the major flood happened.

Watersheds were saturated, streams were flowing high, and Kanopolis dam, about 30 miles southwest of Salina, Kansas, was full when rains dropped 6 to 14 inches of water on most of the eastern third of Kansas in four days, July 9 to 12. The center of the storm, where the most rain fell, was in southern Wabaunsee county.

The Kansas, Smoky Hill (below Kanopolis dam), Neosho, Marais des Cygnes, and Osage rivers rose to devastating heights. They flooded cities, towns and farmland, and at places almost tore the valleys apart. Thousands of persons fled for their lives; damage to municipalities was staggering.

Damage done to farms by the flood-producing rains and flooding streams reached record proportions in Kansas, Missouri, Nebraska and Oklahoma. Nearly two-thirds of the damage resulted from sheet erosion on the watersheds. Nearly 10 percent of the damage was to bottomland. Crop losses, loss of livestock, and damage to pastures, buildings, fences and other agricultural property on bottomland farms accounted for the rest, or about 25 percent, of the total damage.

In the Kansas River valley alone, about 100,000 acres of bottomland was covered with heavy deposits of sand or silt, or deeply scoured. Most tributary channels were choked with debris, or otherwise damaged.

The second great flood, along the Missouri River and some of its upper tributaries, came in May 1952, when unusually warm weather caused melting of the extraordinarily heavy snow blanket that covered the Dakotas and Montana. The ground was still frozen, so water came off the watersheds relatively clear. Very little rain fell during the flood period.

Damages along the 3,000 miles of the Missouri River, and along its tributaries, were not totaled up. Observations indicated, however, that they were rather light compared with the 1951 floods. Towns and parts of cities were flooded, but people had time to evacuate in an orderly manner. They either took their possessions with them or put them in safe places; farmers got their livestock out. Omaha, however, had a terrific battle to contain the river within the dikes along the narrow gap through the city.

Land damage was most evident along the Milk River in northern Montana, and along the Missouri River in the vicinity of Yankton, S. D., and on bottomland below Sioux City, Iowa. Detrimental deposits of sand or silt and gouging were rather severe in a few areas, and many drainage canals were impaired. But, because melting snow was the source of the floodwaters, few of the smaller tributary channels sustained damage.

Farmers, SCS, Other Agencies Make a Team

A feeling of helplessness prevailed after the 1951 floods. Most bottomland farmers were near the end of their resources; many had lost nearly everything, even their land. Urban communities were so hard hit that they could do little to aid rural flood victims. The people were more than ever at the mercy of the floodwaters because of damage done to the streams — and they knew it.

The Soil Conservation Service was instructed by the Secretary of Agriculture to report the needs for, and help carry on operations in, flood rehabilitation. This required appraisal by the Service of work needed on tributary channels and helping County Agricultural Mobilization Boards appraise farmland rehabilitation needs.

Survey of the damage to tributary channels was handled by the Water Conservation Division of the Regional Office of the Soil Conservation Service at Lincoln Nebraska, aided by Soil Conservation District supervisors and SCS field personnel. For farmland rehabilitation, the Soil Conservation Service helped determine what to do about damaged farm drainage systems, land damaged by silt or sand deposits or gouging, and damaged upland water-control measures.

When the Missouri River flood occurred in 1952, the SCS had the experience and was organized to help determine needs by counties speedily.

Funds from three sources financed flood rehabilitation work by the Soil Conservation Service in the Northern Great Plains Region. The first was an emergency allotment of $105,000 from the S C S appropriation under the Flood Control Act. Rehabilitation operations under this fund were begun concurrently with the surveys, and the first contract was let August 22, 1951. The second source of funds was the emergency appropriation voted by Congress in November 1951. The third was the Missouri River flood rehabilitation appropriation voted by Congress in June 1952.

A total of $1,910,-143 was expended by the Soil Conservation Service in restoring capacities of tributary channels, for which it was solely responsible. The purpose was to repair those channels where the floods had imposed threats of flooding which had not existed previously. Each project had to affect two or more farms, and of a nature that they could not be handled by the farmers. Work was done by contracts awarded by the Soil Conservation Service, which also supervised performance. Most contracts were for hourly rental of equipment, because the mixture of debris with the sediments made a firm lump-sum bid impractical. Some contracts were on the job or cubic-yard basis, however. In one case. the job was handled through cooperative agreement with a county, and in another. a Soil Conservation District was awarded the contract.

The Service expended $548,419 for technical services in the farmland rehabilitation work. Payments to farmers under this program were made by the Production and Marketing Administration. This was work on individual farms. Approved projects were carried out by the landowner, who was repaid up to 80 percent of the cost, subject to the standard limitation for such type payments per ownership.

Soil Conservation Service technicians furnished the technical services in all rehabilitation work dealing with the soil survey, repair of farm drainage systems, and repair of upland conservation structures damaged by the flood-producing rains.

No Added SCS Personnel for Rehabilitation

The Soil Conservation Service procured no added personnel or equipment flood rehabilitation. It did this job with its regular personnel and along with its regular work of helping cooperators with Soil Conservation District apply soil and water conservation to their lands.

Rehabilitation work was so administered that 44 men were detailed to flood areas from other parts of the Region when they could best be spared from their home stations. For example, the heavy survey and design load in the Kansas flood area came at a time when field operations were at low ebb in the north. Consequently, the regular work of the Service was hampered little except where flood damage had been severe. Except for a few administrative employees for contract awards, the detailed personnel were engineers and soil scientists.

The Soil Conservation Service depended on Soil Conservation District boards of supervisors to help determine priorities. Thus, available funds were used on the most important channel rehabilitation projects. Priorities in farmland rehabilitation, of course, were decided by County PMA committees.

Knowledge gained by the Soil Conservation Service in soil and water conservation and watershed treatment assured that the measures used in rehabilitation had been tried and proved in previous years, either in the Great Plains or elsewhere in the United States.

Farmers handled right-of-way and other legal details for channel restoration. In some instances, farmers and industrial concerns provided land for changes in alignment of parts of channels or wrecked stream barriers where the changes would save federal funds. Farmers, businessmen and other local people provided materials for replacement of flood control structures. County and drainage districts contributed to the limit of their resources in projects in which they could participate legally. Farmers handled the disposal of debris removed from channels.

Since much of this local contribution was in work and materials, it is difficult to put a definite money value on it. The estimate is that local participation ranged in value from 10 to over 50 percent of the total cost of projects. In farmland rehabilitation, farmers had to pay at least 20 percent of the cost, but many spent up to double the amount of federal aid.

Newspapers and radio stations gave freely of space and time to broadcast information about rehabilitation work—what it was and how aid could be secured. They also kept abreast of progress, telling where rehabilitation jobs could be seen.

Other agencies besides the Soil Conservation Service and the PMA participated. The Kansas Experiment Station, in particular, played a major role in the determination of conditions under which deep plowing of sand deposits was feasible, and the fertilizer recommendations for sanded lands. These recommendations were accepted in general by other experiment stations. Extension Service specialists and County Agents did an excellent job of education concerning the rehabilitation work. The Farmers Home Administration, with funds from the two flood rehabilitation appropriations, made emergency loans to farmers who needed them to pay their share of farmland rehabilitation costs.

Over 12,000 Rehabilitation Jobs Handled

A total of 472 channel restoration jobs was handled by the Soil Conservation Service in the Northern Great Plains at a cost to the federal government of $1,910,143. These were to remove threats of flooding along the tributary channels that had not existed before the floods of 1951 and 1952. They benefitted 4,210 farms, or an average of 9 farms per job. The operations restored, and in some cases increased, the capacities of the tributary channels. J. M. French, on Spring Creek, near LeCompton, Kansas, told the story: "If this work had not been done, our land would have been flooded seriously by runoff from the hill land in the spring of 1952. The creek was dammed at many places by big deposits of debris and silt, and the water would have had to spread out over the land."

Technical aid was supplied by the Soil Conservation Service in connection with the rehabilitation of 522,392 acres, belonging to 11,650 farms. As a result of the rehabilitation work, the majority of the land damaged in the Northern Great Plains by the 1951 floods and most of the land damaged by the Missouri River flood was in production in 1952. Experiences in previous floods indicated that many years would have been required for rehabilitation of this land without the aid that was supplied by the federal government through the SCS and PMA, and the State Experiment Stations and Extension Services.

Fertile Bottomland Returned to Production

Below are two examples of farmland rehabilitation and on the next 10 pages are pictures depicting five representative channel restoration jobs.

Barrier Wrecked; River Has Clean Sweep

For ages before the 1951 flood of the Kansas River, a natural barrier had kept the river away from the land seen in the upper picture. That picture shows part of the 2,500 acres of the Hunter's Island and Moehlman communities that were flooded when the river destroyed nearly all of the barrier. Destruction of the barrier also opened the way for flooding of part or all of this land in the future every time the river rose more than four feet.

The center picture is an overall view of where the natural barrier was. It extended from the small building at the right to a remnant of the natural barrier in the center of the picture, and from there to the trees in the background. A close-up of the area in the background, taken before rehabilitation work, is seen in the lower picture.

Before the flood, eight homes and a schoolhouse had been built on the barrier. This was the Moehlman community, which was destroyed. No parts of the buildings or their contents were found, except for a few heavy articles such as refrigerators and the bell tower of the school. They were a considerable distance downstream.

New Barrier Guards Bottomland Farms

A new barrier now stands guard over the Hunter's Island and Moehlman communities' lands. The upper picture, a repeat of the center picture on page 6, shows part of it. Trees in the center of the picture obscure the other part.

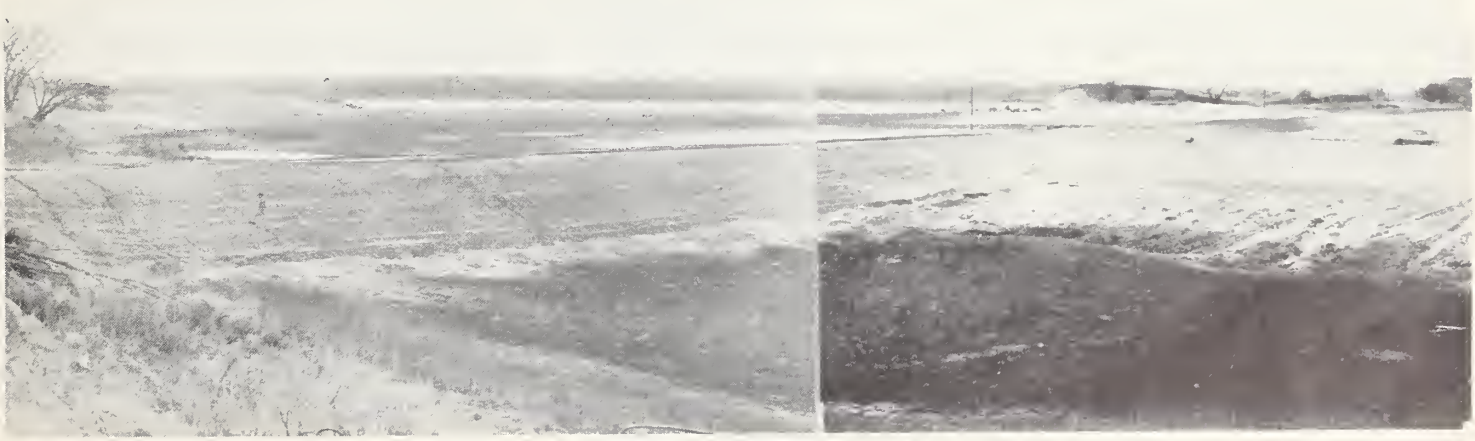
The second picture from the top is a close-up of the part of the barrier shown in the upper view, but looking in the opposite direction.

Equipment used on construction is seen in the third picture. Clay was hauled from a mile away, since soil in the area where the barrier was built is sandy. Water to the right is not part of the river. It is standing water in an area gouged out by the flood. The barn in the background is the same barn that is seen in the top picture.

The bottom picture shows the part of the barrier built at the place shown at the bottom of page 6. The river is in the background.

Residents of the area secured the right-of-way for realignment of the barrier. Some of the right-of-way was costly. The Union Pacific Railroad gave a substantial sum to pay for supplies and to pay fees for state review of plans and approval of design. The Bayer Construction Co. of Manhattan, Kansas, got the construction contract. A total of 82,761 yards of earth was moved. The Riley County Soil Conservation District undertook the job of seeding the barrier to grass and establishing trees on the river side.

Total cost to the federal government was $60,093.76.



Floodwaters Break Big Drain Structure

Replacement of a big structure in the Burt-Washington Drain in eastern Nebraska was the biggest rehabilitation job undertaken by the Soil Conservation Service, in point of cost.

This structure, a flume beneath the Tekamah-Silver Creeks floodway aqueduct, was destroyed by the Missouri River flood. Its location was just below the junction of the Tekamah Creek and Silver Creek floodways, which had been built nearly 40 years previously to eliminate flooding by the creeks and the heavy damage to bottomland that resulted.

Stresses created by the Missouri River floodwaters broke the huge concrete structure at the outlet end. The broken part dropped, partially closing the triple 8x8-foot box-type culvert structure.

The upper picture, taken from the bottom of the drain, shows the concrete that had broken loose and settled. The middle picture, taken from above, shows the break.

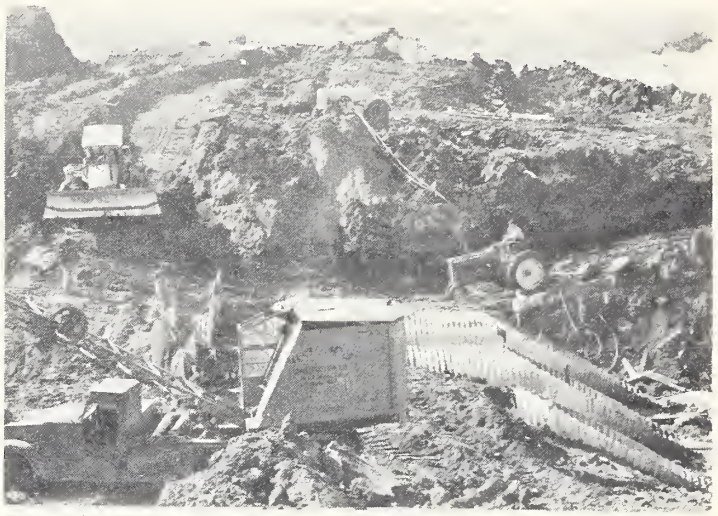
After examination, it was decided that the least expensive way to repair the drain would be to relocate the flume a short distance to the east. This also would eliminate two sharp curves in the channel.

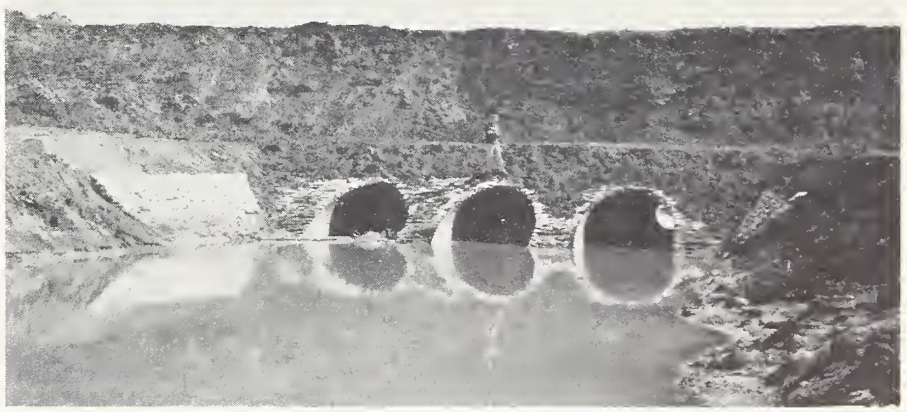
The lower picture shows one of the draglines used to dredge the new stretches of drain above and below the new flume, and the trench into which the new flume would be put. This picture was taken looking east from just above the old flume. Part of the aqueduct channel can be seen in the foreground.

All excavation, replacement of the fill, and restoration of that part of the floodway aqueduct was done by the Drainage District.

Flood rehabilitation funds were used for materials and installation of the new flume, packing earth around the pipes, and construction of riprapping to protect the outlet and inlet ends of the flume.

All's Well Again; New Structure in Place





Rehabilitation of the Burt-Washington Drain necessitated the installation of three huge galvanized iron tubes.

Upper left is a picture of the tubes. Note their size, compared with the men working on them. Also, note how long they are. There is a large concrete collar at the midway point to provide added weight, and galvanized iron collars at each end to prevent seepage along the tubes. One of these is already in place in the background.

Upper right is a view of work on replacing the fill, after earth had been packed around the tubes.

The second picture from the top shows the fill completed. Part of the Tekamah Creek aqueduct can be seen in the background; the Silver Creek floodway is on the bank coming in from the right. This picture, looking west, was taken from the east end of the new fill. The old flume is under the embankment about in the center of the picture.

Second picture from the bottom is a view of one end of the new flume. Note the riprapping for protection.

The bottom view, looking east from the west end of the new fill, shows the aqueduct restored on the new fill.

The contract was awarded in November 1952. Expenditure of federal funds, $63,935.

Upland Channels Damaged by Floods, Too

Channels tributary to the main streams were choked with sediment and debris, both in their upland reaches and where they cross the river bottomlands. Frequent flooding, in the future, of land adjacent to them was a certainty unless the channel blocks were removed.

These pictures deal with a typical channel rehabilitation project in the upland. They show part of Cross Creek, about 8 miles north of Roseville, Kansas, near which the creek enters the Kansas River.

The upper picture shows how the channel is blocked by dead trees and sediment that had been washed down by the floodwaters on their rush toward the Kansas River. Note how the channel block dams the water even at a time of low flow. The east-west state highway crosses the creek on the bridge seen in the background.

Even though the flow of the creek was low when it was taken, the center picture shows the stream to be out of its normal channel above the channel block.

Severe flooding of cropland occurred near the channel block shown in the top picture. This field is just east of the creek and south of the east-west road. Some scouring occurred at places where water is seen still standing on the surface. This is only part of the land that was flooded by water forced out of the creek because of damming of the channel.

Channel Restored; New Flood Threat Gone

Men with power-driven chain saws, shown in the picture at the upper left, removed standing timber that obstructed the channel. Other men used a power-driven winch, seen on the top of the bank in the picture at upper right, to pull the timber from the channel block. The debris was piled on the bank for the farmers to dispose of it.

The picture at right center shows the channel of this section of Cross Creek as it appeared when the rehabilitation job was completed.

At the lower right is a view of the land that had been flooded, shown in the bottom picture on page 10.

The Soil Conservation Service awarded the contract for rehabilitation of the 20-mile-long channel of Cross Creek to three contractors. Total expenditure of federal funds was $16,899.

Bottomland Channels Filled With Debris

Spring Creek, near LeCompton, Kansas, is one of many streams from upland that must cross bottomland for relatively short distances. Since bottomland usually is higher near the river, because of flood deposits, creeks must meander downstream to find openings to enter the rivers.

Kansas River floodwaters in 1952 filled Spring Creek, and others like it, with deposits of debris and silt that completely blocked the channel. As a result, fertile river bottomland faced flood threats that had not existed previously—new threats from the creeks, not the rivers.

The picture at upper left shows the channel blocked almost on its entry onto the bottomland. This block was just below the Santa Fe railroad tracks, which skirt the hills.

Another tangle of debris and silt is shown at upper right.

The middle picture is looking downstream at a block near the Kansas River. The channel had been obliterated. The bottom picture was taken about 50 feet farther downstream on the same channel block.

Debris Removed; Creek in Top Notch Shape

The picture, upper right, shows Spring Creek just below the Santa Fe tracks after rehabilitation.

At the upper left, a dragline is seen removing the silt that had been deposited in the channel. The tree in the left foreground is the one seen in the left foreground of the middle picture on page 12.

Before the channel cleaning could begin, the banks had to be cleared so that equipment could operate. The small picture, left, shows part of the creek after clearing.

The middle picture, right, is a repeat of all except the upper left on page 12. The man is standing at the place of the channel block shown at the upper right on page 12. The channel through the block shown in the lower pictures on page 12 is in the background.

Below is a close view of the channel near the Kansas River. Note the depth of the silt deposit there.

Contract for restoring Spring Creek channel was let in September 1951. The cost was $4,382. Disposition of debris was handled by the farmers.

Much Land Was Guarded by This Long Drain

Lee Creek Drain, west of Wamego, Kansas, was built to keep the water in a creek from the upland in bounds as it moves across the bottomland to the Kansas River after heavy rains. Most bottomland drains in the 1951-1952 flood areas serve that purpose.

This drain is about 4 miles long. Floodwaters from the Kansas River went over the drain's banks, deposited much sand in the channel, broke the banks at places, and at other places, wrecked the drain. Lee Creek was flowing. The water went through one of the breaks near the upper end when it encountered the blocked channel.

The picture on the upper left shows where Lee Creek went through the break. You can see that the silt deposit to the left is deep. To the right of this picture is a view of part of the land protected by the drain.

Second from the top is a view near the lower end of the drain. Here the floodwaters destroyed a concrete bridge and made a general mess of the channel.

Below that picture is a scene midway along the drain. A wall of a building had become lodged in the channel, trapped silt, and made a real channel block.

The bottom picture shows a side of flood damage not usually thought of. It is the side-cutting that results when floodwaters run uncontrolled to a drainage. Gouging on this fertile bottomland field was done by the Kansas River floodwaters in 1951.

Farmers Below Drain Breathe Easily Again

Although one of the longest jobs in terms of distance, repair of Lee Creek Drain was by no means one of the most costly. It was handled by three contractors. Cost to the federal government was $5,568.25.

The drainage district expended available funds on repair of some of the breaks in the banks. Wamego businessmen financed the handling of legal details preceding the rehabilitation work.

The two pictures at the upper left are repeats of the upper left view on page 14. One shows the carry-all and tractor with bulldozer blade repairing the break in the bank. Below is a view of the finished job.

Upper right is one of the draglines used in the removal of silt. Note the depth of the cut.

Second from top (right) shows the rehabilitated channel where floodwaters had destroyed the bridge.

Next to bottom (right) is a view of the place where the wall became lodged, and a general view of the restored drain.

The bottom view shows the gully, which the floodwaters started, had been eliminated.

Watershed Treatment Slashes Flood Costs

Watershed treatment can reduce materially the upstream damage by floods and consequent rehabilitation expense. It can prevent such damages in some small watersheds. Examples are the Schippel Ditch watershed near Salina, Kansas, and the Haushems Creek watershed above Brock, Nebraska. These small streams were kept in their banks during the 1951 flood period.

The Soil Conservation Service made a study of losses on upland and along floodplains of streams tributary to the Kansas River on areas where flood control works that have been authorized would offer no protection. Estimates were made of the reduction in damages if complete soil and water conservation treatment—plus floodwater retarding reservoirs, floodways, channel and waterway improvements, grade stabilization structures, and diversion dams—had been applied on the watersheds.

Losses of topsoil from those watersheds were estimated at $200,000,000 and upland crop losses at $110,000,000. Investigations on other watersheds led to the conclusion that these losses could have been reduced by 30 to 90 percent, depending on the character of the watershed.

Losses on the floodplains along the tributaries were placed at $108,350,000. Slightly over 85 percent was damage to crops, farm buildings, fences, farm machinery and equipment, and loss of livestock. It is estimated this would have been reduced by one-third by watershed treatment. Slightly over 8 percent of the bottomland damage was to land through scour, deposition, streambank erosion and swamping, which could have been cut a third. The balance of the damage was the silting of reservoirs, and an estimate of silting that would have occurred in authorized reservoirs if they had been built. These damages could have been reduced by more than half.

Soil Conservation Districts Can Take Lead

Soil Conservation Districts are the foundation for watershed treatment, since conservation of soil and water on the farmlands is the necessary first step.

Soil Conservation Districts are locally organized and governed, independent, and democratic. They have proved to be the most pracical medium for bringing to the farmers the aid they need in establishing conservation on their land. They have developed programs that meet the conservation needs of the areas and enable farmers to work together voluntarily to carry out the District programs.

Boards of supervisors of Soil Conservation Districts can channel aid they receive, such as technical services of the Soil Conservation Service, toward establishing conservation on small watersheds in their Districts. They can do this even on watersheds with land in more than one District.

Watershed associations may have to be formed to provide the additional flood prevention measures with which urban people and bottomland farmers are concerned.

Conservation treatment of land in a watershed comes first. That is a job for the farmers themselves. They are making good progress in cooperation with their Soil Conservation Districts.